Lab partners with local company to market protein technology

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LOS ALAMOS, New Mexico, July 14, 2008— Scientists who study how proteins assemble and fold into distinct shapes may soon see shape-shifting in the very methods they use, thanks to a partnership between Los Alamos National Laboratory and Theranostech Inc., an Albuquerque-based biotechnology company.

This local startup company honed its skills in protein purification by developing an efficient test for Human Immunodeficiency Virus (HIV). Now, Theranostech will package the “Split GFP” reagents, part of the Green Fluorescent Protein ToolBox developed by Los Alamos biochemist Geoff Waldo. Promising improvements in flexibility, cost, and speed when compared with the existing fluorescent technology, Waldo’s system uses green fluorescent protein (GFP) to measure the quantity and the solubility (a measure of activity) of important proteins.

These easy-to-use kits are aimed at scientists in academia and other areas outside the commercial arena to research, for example, the molecular conditions that cause

Alzheimer's or other diseases involving proteins. Previously, Waldo distributed hundreds of these tools piecemeal to researchers upon request. But he can no longer keep up with the skyrocketing demand, so the partnership, by way of an exclusive license signed in early June with Theranostech, will make the tools available for purchase. In addition to helping Theranostech diversify its portfolio, said David Hadley of Technology Transfer at Los Alamos, the Lab sees this type of partnership with small, New Mexico-based companies as a valuable investment in the local community that in turn helps Lab scientists market their discoveries. "We see the potential for a stronger future relationship with Theranostech," Hadley added. Waldo and Los Alamos also have separate agreements with other companies directly involved in protein research and pharmaceutical development.

In the widely used technology, bits of GFP – derived from glowing jellyfish – attach to parts of the protein researchers look at, creating a "tag" that glows bright green in blue light. Investigators subsequently deduce structure and function from their samples. However, prior incarnations of GFP were expensive, labor intensive, or clunky, changing the behavior of critical proteins or disrupting their natural "folding," in which the chemical structure of the molecule contorts itself, ultimately determining the protein's role in a biological system.

These complications to this popular technique have hindered scientists' understanding of proteins, Waldo said. "Unlike DNA, where the technology is pretty well worked out, protein projects lagged behind," he added. That is, until now.

Waldo engineered Split GFP so that it doesn't require a lot of expensive equipment and doesn't alter protein behavior. He hopes researchers can go beyond the "low-hanging fruit" in proteomics research and probe more deeply into the mechanisms of protein function, Waldo said, adding, "Split GFP is the easiest to use and most stable in-vitro protein assay kit in the world right now."

Another incarnation of the Split GFP system – the so-called in-vivo Split GFP assay – allows characterization of proteins in living cells, a major breakthrough that could shed light on problems that have perplexed protein researchers for years. For example, Gail Johnson and co-workers used the in vivo Split GFP to monitor factors affecting aggregation of tau protein in neurons, paving the way for similar work on other diseases of protein aggregation, or clumping, such as Alzheimer's (see J Neurochem. 2007 Dec; 103(6) pp. 2529-39). Recently, Cori Bargmann, a leading neurobiologist at the Howard Hughes Medical Institute of The Rockefeller University, and coworkers used the LANL in vivo split GFP system to study formation of new contacts forming between living neurons. The team recently published their work in the February 07 (2008) issue of the journal Neuron.

With such fertile ground, plans are under way to release a kit-ready form of the in vivo Split GFP assay for use in mammal cells and other eukaryotes, as well as newly optimized version for screening protein expression in living bacteria such as E. coli, the workhorse used by many labs to express recombinant proteins. A major advantage of the LANL Split GFP technology is that unlike other protein assay kits, it can be used both in the test tube and in living cells. With these tools, scientists can move seamlessly from living cells to the test tube without skipping a beat. "That's what we do here at Los Alamos," Waldo said. "We develop technology to solve problems. Here, necessity really is the mother of invention."

For more information, visit the GFP ToolBox Web site at http://www.lanl.gov/projects/gfp/index.shtml.


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